Master's Thesis

Ms (1) (carbon of thesis & orig. tables)

A REVIEW OF THE FOSSIL BIRD, PARAPAVO CALIFORNICUS, (Miller) FROM THE PLEISTOCENE ASPHALT BEDS OF RANCHO LA BREA

INTRODUCTION

Parapavo californicus was first described in the Pleistocene avifauna of Rancho La Brea, from a tarso-metatarsus, by Loye H. Miller, in 1909. At this time the fossil was placed with the old world peacocks under the genus Pavo, and described as a new species, californicus. In 1916, with more fossil material available, as well as additional recent material for comparison, Miller redescribed the species, placing it in a new genus, Parapavo, which, it was concluded, occupied a position intermediate between the turkey of Yucatan, Agriocharis ocellatus, and the old world peacock, Pavo, thus forming a connecting link between the Meleagridae and the Phasianidae.

Wetmore, in 1924, made the following statement with regard to Parapavo: "From examination of the tarsal bone it is my opinion that Parapavo is a meleagrine form intermediate in its characters between modern Meleagris and Agriocharis."

Due to the vastly greater ~~amount~~ number of specimens of the fossil species now available in the Los Angeles Museum collections, as well as to the added number of specimens of the two recent genera of turkeys, Agriocharis and Meleagris, it has been possible to review the species, Parapavo californicus on a larger and more conclusive scale.

The purpose of such a review has been to bring out, as nearly as possible, the systematic position of Parapavo californicus, by a comparison of this species with representative forms of the Meleagridae and Phasianidae. Of the Meleagridae there are, today, two species, (Agriocharis ocellatus) and Meleagris gallopavo, both of which are available for comparison. Of the Phasianidae, the peacock, Pavo, alone is considered, and only one species, P. cristatus, is available. The tarso-metatarsus of Pavo muticus as figured by Milne-Edwards is used by Miller in his first description of the fossil species, but has not been further considered here.

The writer takes this opportunity to express appreciation to Dr. W. A. Bryan, through whose kindness the specimens of the Los Angeles Museum collection have been available for this study; to the United States National Museum for the loan of the additional modern comparative material; and to Dr. Loye H. Miller, whose cooperation in lending the comparative material of his collection, and whose kindly interest at all times has aided in the completion of this work.

OCCURRENCE

The type specimen of Parapavo californicus was obtained from the Pleistocene asphalt deposits at Rancho La Brea, situated about seven miles west of the center of the city of Los Angeles. Since the discovery of this specimen at Locality #1059 of the University of California collecting area, other specimens have been removed from various other excavations at Rancho La Brea by the University and by the Los Angeles Museum. The number of specimens now available in the combined collections of the University of California and the Los Angeles Museum numbers over a thousand, the species being next in abundance to the raptores.

Miller, in 1911, recorded the appearance of a meleagrid type, presumably of the genus Meleagris, in the Pleistocene Potter Creek Cave deposits of Shasta County. Later, in 1925, he says, referring to this type, " bones referable either to Parapavo or to Meleagris occur in the Pleistocene of Potter Creek Cave". The material representing this genus is scant, only eight specimens, of which but two "an almost perfect humerus, and the major part of a coracoid" are well preserved.

Aside from the specimens from Rancho La Brea and Potter Creek Cave, no other material referable to Parapavo has been discovered.

It is upon the specimens of Parapavo, now in the Los Angeles Museum collection, that the present report is based.

(Note M. richmondi Shufeldt and quote here.)?

SKULL

(Plate I, Figs. 1-6)

Material available.-- 10 Parapavo (crania); 11 Meleagris; 3 Agriocharis; 2 Pavo.

General shape.-- Meleagrid rather than phasianid, having broad frontals flaring over the orbits. Dorsal view compared with Agriocharis and Meleagris: Agriocharis with broad frontal (Plate I, a) tapering back to narrower parietal (Plate I, b); supraorbital flare pronounced (Plate I, c). Meleagris less tapering from frontal to parietal (two regions more nearly equal in breadth); supraorbital flare less. Parapavo intermediate between Agriocharis and Meleagris in relative breadth of frontal and parietal regions; supraorbital flare as in Agriocharis.

Height of parietal relative to height of frontal region.-- (Plate I, figs. 1-4, 5-6) Highest in Meleagris; Agriocharis lower; Parapavo slightly lower than Agriocharis; Pavo lowest.

Region of fronto-parietal suture.-- (Plate I, d) Transverse depression along suture in Parapavo and Agriocharis only; depression most marked medianly in Parapavo; Agriocharis with lateral depressions as well; slight median depression in Pavo; none in Meleagris.

Depression in region of frontal suture.-- (Plate I, e) Greater in Parapavo than in Meleagris or Pavo; character variable in Agriocharis, though tending to greater depth than Meleagris and Pavo; differing in shape and extent from Parapavo.

Measurements.-- Material available for measurement: 8 Parapavo; 6 Meleagris; 4 Agriocharis; (Pavo not considered because of decided difference in shape of skull). Measurements made: (a) Breadth of frontal at widest portion; (b) breadth of frontal at fronto-nasal suture; (c) ratio of (b) to (a). (See Table I).

Relationships ~~Relationships~~.- In general shape the skull of Parapavo is similar to the Meleagridae. In details of shape, the fossil genus most nearly approaches Agriocharis, but is not identical with it.

Measurements of Skull Table I

Parapavo

Breadth of frontal (a) at widest portion	(b) at fronto-nasal suture	ratio of (a) to (b)
36.7mm.	15.3mm.	41.6%
34.2	15.1	44.1 *
37.2*	15.2	40.5
37.1	13.8a	37.1
33.4*	12.4	37.1
37.2*	13.8	37.0 *
37.0	14.4	38.9
34.1	13.1	38.4

Meleagris

34.5	15.7	45.5
33.7*	16.1	47.7
34.0	16.5	48.5
38.7*	18.1	46.7
34.1	15.0	43.9 *
33.7*	16.6	49.2 *

Agriocharis

32.5	13.5	38.3
32.0	12.6	39.3 *
30.5*	12.0	39.3 *
34.9*	13.6	35.8 *

Average ratio: Parapavo 39.3%; Meleagris 46.9%; Agriocharis 38.1%.

* = extremes

Conclusions.-- In general shape the skull of Parapavo is similar to the Meleagridae. In details of shape, the fossil genus most nearly approaches Agriocharis, but is not identical with it.

X

number of specimens?

STERNUM

(Plate II, Figs. 1-11)

Carina.-- (Plate ~~II~~ figs. 1-4 a) Shape: Slightly curved as in Meleagridae[1]; Pavo having carina strongly curved upward, with tip facing anteriorly. Of the two turkeys approaching Agriocharis in size less curvature than Meleagris Breadth at anterior end: Resembling meleagrids; broader than Pavo.

Contour of manubrium and adjacent region.-- Lateral view: (Plate ~~II~~, figs. 4-6, b), Resembling turkeys; pointed anteriorly; lacking broad, blade-like appearance characteristic of Pavo. Inner view: (Plate ~~II~~, figs. 1-4 b) More like Meleagris than Agriocharis, but not identical.

Inner surface of body.-- Having two lateral depressions anteriorly, as in Meleagris and Agriocharis; depression lacking in Pavo, small perforations marking their position. Plate ?- fig 1-4-c

Relationships.-- The sternal element of Parapavo is of meleagrid character, tending, in the one characteristic which is dissimilar in the two modern genera, toward affiliation with Meleagris.

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[1] One immature Parapavo with upward curving tip as in Pavo, but otherwise similar to Meleagridae.

Meleagris 13, Agr. 3, Pavo 3, Pp. ? 11 + frags.

FURCULA

(Plate III, Figs. 1-4)

Material available.-- 11 Parapavo (fragments); 4 Meleagris; 3 Agriocharis; 2 Pavo.

General shape.-- Anterior view: Straight-sided, resembling Meleagris; Agriocharis and Pavo curving outward. Lateral view: slightly convex posteriorly; Meleagris straight; Agriocharis straight ventrally, becoming concave posteriorly at proximal (dorsal) end; Pavo decidedly concave posteriorly.

Furcular process.-- (Plate III a) Exact shape indeterminable, due to fragmentary state of material, but showing decided dissimilarity to Pavo; Pavo large and flange-like, as in Gallus;

Osseous area dorsal to furcular process.-- Shape: Broad and flat in Meleagris; thicker antero-posteriorly in Agriocharis; no suggestion of flatness in Pavo, as thick antero-posteriorly as laterally; Parapavo between Agriocharis and Pavo in thickness, but like Meleagris in breadth. Markings on posterior side: Unlike any of modern species examined; nearest to Meleagris specimens. Muscle scars of anterior surface: Distinctly marked, as in Pavo, but of different pattern; indistinct in Meleagris and Agriocharis.

Measurements.-- Length of furcular process, measured from superior border of osseous area at angle to tip of process, relative to breadth of furculum at superior border. (See Plate III, fig. 2b, xx and yy, for position of measurements). (See Table II for measurements)

Relationships:-- That Parapavo is generically distinct from Meleagris, Agriocharis and Pavo is evident. Though in the shape of the bone and of the furcular process of the bone, Parapavo is meleagrid rather than phasianid in character, it cannot be placed within either of the modern genera of turkeys. It is more nearly like Meleagris than Agriocharis, but its posteriorly convex contour and greater length of furcular process (which, if the process were unbroken, would be even more marked), as well as greater depth through the region of the angle, indicate distinctness of the two genera. In length of furcular process, only, does the fossil genus approach Pavo, but the decided difference in shape in the two genera overbalances this one point of similarity.

CORACOID

(Plate ~~IV~~, Figs. 1-~~7~~)

Material available.-- 43 Parapavo; 31 Meleagris; 8 Agriocharis; 3 Pavo.

Outer side of sternal end.-- Straight or slightly convex, as in turkeys; Pavo with decided notch converting this edge into two protruberances.

Flexure of upper end.-- (See Plate ~~IV~~, figs. 1-8) Parapavo unlike any of modern genera as noted particularly by extent of tendinal groove, (Plate ~~IV~~, b), position of head (Plate ~~IV~~, c), shape of ~~subclavicular~~ praecoracoidal process (Plate ~~IV~~, d); greater difference between Parapavo and Pavo than between the fossil genus and the meleagrids.

Shape of head.-- (Plate ~~IV~~, figs. ~~5-8~~ 1-4, c) Oval in outline, with slight notch on lower side near interior border; nearest to Meleagris; Agriocharis more round than oval, with shallow notch further removed ~~removed~~ from interior border; Pavo unlike any of the above, with irregular outline, and lower side concave.

Scapular facet.-- (Plate ~~IV~~, e) Similar to turkeys in being decidedly concave; in Pavo slightly convex. Shape of facet differing from either Meleagris or Agriocharis; more rounded; lower margin ending about 3 mm. from ~~subclavicular~~ praecoracoidal process, and but slightly raised above shaft of bone adjacent to it; in modern genera, lower margin extending to tip of ~~sub-clavicular~~ praecoracoidal process, and having decided slope from this margin to adjacent portion of shaft.

Attachment of coraco-humeral ligament.-- (Plate ~~IV~~, e) Triangular and having distinct border at outer side of bone, as in Meleagridae; Pavo rounded and ending indistinctly on outer side. Inner side of surface ending abruptly in Meleagris; less abrupt ending in Agriocharis; of 43 specimens of Parapavo, 5 approaching Meleagris, 38 having more gradual ending than Agriocharis.

Muscle line on inner side of posterior (superior) surface.-- Slightly curved from edge of shaft, as in Meleagris; Agriocharis with line following outline of shaft at edge; decidedly curved from edge in Pavo.

Relationships.-- Parapavo, though meleagrid in character, is distinct from either of the existing genera in the scapular facet, flexure of upper extremity, and attachment of coraco-humeral ligament. In the position of the muscle line of the inner side of the posterior (superior) surface, and the shape of the head, the fossil genus is nearest Meleagris.

SCAPULA

(Plate V, Figs. 5-11)

Material available.-- (For measurement) 8 Parapavo; 8 Meleagris; 4 Agriocharis (2individuals); no Pavo measured; bones of 2 individuals available for comparison.

General shape.-- Similar to turkeys in position and shape of ~~coracoidal~~ tendinal furrow and glenoid~~al~~ facet~~s~~ (Plate V, c and d), and pneumatic orifice (Plate V, e); in Pavo pneumatic orifice occurring between ~~coracoidal~~ tendinal furrow and glenoidal ~~facets~~; in meleagrids occurring on outer side of scapula, distal to both ~~facets~~ areas.

Measurements.-- Taken in meleagrids and Parapavo, not in Pavo, due to difference in position of ~~facets~~ thyaboxeareas. Measurements taken: Length of ~~coracoidal~~ tendinal furrow, relative to length of glenoid~~al~~ facet. (See Table III).

Relationships.-- In this element, Parapavo is unmistakably meleagrid in character. Because of the marked dissimilarity to Pavo, the latter genus was not considered in the measurements. The character of relative length of ~~coracoidal~~ tendinal furrow and glenoid~~al~~ facet~~s~~ is the only one which differs in Meleagris and Agriocharis, and in this character, as indicated by the ratios shown in Table III, Parapavo is more nearly coincident with Agriocharis, though the limited number of specimens of the latter genus make any conclusions, as to the identity of the two, unwise.

See if glenoid or glenoidal.

HUMERUS

(Plate VI, Figs. 1-4)

Material available.-- 99 Parapavo; 50 Meleagris; 6 Agriocharis; (1 male, 2 female individuals); 4 Pavo (2 individuals).

General shape.-- Resembling meleagrids; Pavo differing from meleagrids and Parapavo in shape of proximal end, and slenderness of bone. Proximal end narrower than Meleagris, broader than Agriocharis. Head more pronounced than in either of modern turkeys.

Muscle attachment on anconal side near proximal end.-- (Plate ~~VI~~, a) In Pavo, slightly raised with slight depression in center; narrow and elongated, approximately same width at ends as at middle; in Agriocharis, ~~cigar-shaped~~ fusiform -- broad in middle, tapering towards the ends --, no raised portion, but marked depression along inner side extending over half the length of the ridge; Meleagris similar to Agriocharis, but with depression deeper, and confined more to distal end of ridge; of 41 specimens of Parapavo, 24 similar to Agriocharis, 17 similar to Meleagris.

? deltoid

Attachment of deltoid muscle just distal to head, on anconal side.-- (Plate ~~VI~~, b) In Pavo roughened and distinctly demar~~cated~~ked from shaft of bone by slight depression bordered by ridges; Parapavo resembling turkeys in having no such distal demarcation; in Meleagris head overhanging at this point more than in Agriocharis; Parapavo intermediate.

{external triceps? (tricipital scar)
{Supraspinatus? (scar of sup.)

Measurements.-- Greatest length: Parapavo californicus 146.8 - 105.8 mm., average male, 136.6; Meleagris gallopavo 149.9 - 108.4mm. average male 141.0mm.; Agriocharis ocellatus 125.4 (male), 104.6 (smallest female); Pavo cristatus 129.4 (male), 117.6 (female). (See Table IV for complete list of measurements).

Relationships.-- With respect to length, Parapavo is between Meleagris on the one hand and Agriocharis and Pavo on the other. Structural characters of the bone are of meleagrid nature. The character of the proximally placed muscle scar of the anconal surface is turkey-like. From the fact that the specimens are nearly evenly divided in this respect in resemblance to Meleagris and Agriocharis, we may conclude, either that in each of the genera this is an extremely variable character, or that Parapavo is actually intermediate between Meleagris and Agriocharis. A certain variability may be noted in the Meleagris specimens and might be found in Agriocharis as well, were more material available. Even allowing for variations, however, the ridge is distinct in the two modern turkeys, and thus it is probable that Parapavo occupies an intermediate position. The attachment of the deltoid muscle also is of intermediate character. The shape of the head presents a character distinct in Parapavo, thus distinguishing it from either Meleagris or Agriocharis.

Comparing these original tables transferred to MS.

TABLE IV

(Measurements of Humerus)

Paranavo

Catalogue Number	Greatest Length	Transverse Breadth of Shaft	Antero-posterior Breadth of shaft
E6011	146.8	15.7	12.3
6701	146.6	16.2	12.2
G1800	143.7	14.6	11.4
E6575	143.1	15.0	12.1
5459	143.0	15.0	12.3
5508	142.8	15.1	12.0
6087	142.1	15.6	12.5
8045	141.9	15.0	11.8
6275	141.8	15.1	11.9
5626	141.8	15.7	12.8
5279	141.3	15.4	11.9
6279	141.0	15.3	12.4
5836	140.9	14.2	11.3
5297	140.2	14.5	11.4
5877	140.2	14.2	11.4
8566	139.7	15.5	12.4
5303	139.7	15.3	12.2
5331	139.7	15.0	11.7
5755	139.5	14.9	11.7
6477	139.2	14.5	11.2
66568	139.1	14.5	11.7
5748	138.8	14.5	11.5
6412	138.5	15.4	12.0
6094	138.5	15.1	11.8
6181	138.5	15.5	12.6
5182	138.2	15.0	11.8
7555	138.2	14.9	11.8
6345	137.8	15.1	12.0
6379	137.5	13.9	11.8
6586	137.5	14.4	11.2
6091	137.4	15.0	11.6
5611	137.3	14.9	11.3
6026	137.0	14.6	11.3
5989	136.7	14.3	11.2
6469	136.6	14.6	11.9
7491	136.6	14.5	11.9
5225	136.3	13.9	11.3
8405	136.2	14.3	11.7
5880	136.1	14.7	11.1
5259	136.0	14.8	11.4

TABLE IV
(Continued)

Parapavo continued

Catalogue Number	Greatest Length	Transverse Breadth of Shaft	Antero-posterior Breadth of shaft
E5746	135.8	13.8	11.1
7460	135.5	14.3	11.4
5186	135.3	14.1	11.0
5754	135.0	14.0	10.8
5294	134.5	14.4	11.4
7966	134.4	14.5	11.5
6151	133.8	13.4	11.0
5747	133.7	13.2	10.6
6344	133.7	14.3	10.8
6515	133.6	13.4	10.7
6699	133.3	15.3	12.4
6149	133.2	14.7	12.0
6944	133.0	13.9	11.7
7108	132.3	14.2	11.3
5751	132.3	13.4	10.5
5633	131.3	14.1	11.2
7708	131.2	14.9	11.4
5285	130.0	13.5	10.8
6164	129.8	13.8	11.0
6270	128.9	14.5	11.6
5506	128.8	14.7	11.4
5292	128.0	13.4	10.8
5237	120.8	11.9	9.3
6354	118.4	13.5	10.8
5945	118.1	12.8	9.4
6169	117.2	12.5	9.9
6214	117.2	11.9	9.5
5191	117.0	12.6	10.1
5268	117.0	12.2	9.5
8234	116.4	11.0	9.0
5750	116.3	12.1	9.1
6415	116.1	13.0	9.6
5630	115.7	12.8	9.5
6668	115.6	12.5	9.7
5516	115.4	11.9	9.4
5270	115.1	12.9	10.4
5963	114.8	13.3	10.5

TABLE IV

(Continued)

Parapavo continued

Catalogue Number	Greatest Length	Transverse Breadth of Shaft	Antero-posterior Breadth of shaft
E5483	114.6	12.7	9.7
6465	114.0	12.8	9.3
7524	114.0	12.5	9.6
5337	113.7	12.0	9.4
8279	113.6	12.2	9.4
5170	113.6	11.2	8.5
6336	113.4a	11.5	8.8
5089	112.8	11.5	8.9
5816	112.7	12.4	9.5
G1764	112.6	12.2	9.3
E5328	112.6	12.3	9.5
6419	112.0	12.0	9.1
6156	11120	12200	9955
7019	11129	12.2	8.9
5437	11188	12.7	9.7
8549	111.8	11.4	8.6
5304	110.9	12.2	9.0
5467	110.8	11.0	8.6
7236	110.1	11.6	8.8
7369	108.3	11.8	8.8
7828	106.6	12.7	9.0
7479	105.8	12.2	8.9
Mean	128.4	13.8	10.7

TABLE IV
(Continued)

Meleagris

Greatest Length	Transverse Breadth of Shaft	Antero-posterior Breadth of shaft
149.9		
~~149.9~~	15.7	12.3
148.6	15.3	12.0
147.3	16.1	12.4
145.9	15.0	11.6
145.2	15.2	11.3
142.9	14.7	11.7
142.5	14.3	11.2
141.9	14.1	11.4
141.5	15.4	11.9
140.7	14.7	11.4
140.6	14.5	11.4
138.3	14.7	11.3
138.2	15.3	11.8
137.9	15.1	11.5
137.8	13.9	11.4
137.1	14.0	11.4
132.2	12.7	9.5
131.1	14.1	10.1
124.4	13.2	10.2
124.3	13.3	10.0
123.4	13.6	9.8
121.6	12.9	10.8
121.0	12.6	10.7
119.8	12.8	9.4
118.8	12.7	9.6
118.7	12.8	9.6
117.9	12.5	9.1
117.6	10.8	9.0
117.2	12.3	9.0
117.1	11.5	9.2
116.8	12.1	8.8
116.5	12.8	9.7
116.5	12.3	9.1
116.4	12.5	9.1
116.2	12.2	9.5
115.5	12.0	9.1
115.2	11.6	9.4

TABLE IV
(Continued)

Meleagris continued

Catalogue Number	Greatest Length	Transverse Breadth of Shaft	Anterp-posterior Breadth of shaft
	114.9	11.2	9.5
	114.6	12.7	9.4
	114.5	12.1	9.1
	113.7	10.5	7.9
	113.1	12.0	8.9
	112.4	12.6	8.9
	112.0	11.5	8.4
	111.8	10.5	8.1
	111.5	11.9	9.0
	110.5	11.9	8.8
	108.8	11.0	8.7
	108.4	12.5	9.0
Agriocharis			
19851*	125.4	13.1	10.1
19851	125.4	13.0	10.0
288710[1]	104.9	11.2	9.1
288710	104.6	11.4	9.4
288711[1]	105.0	11.5	9.3
288711	104.7	11.6	9.4
Pavo			
208*	129.4		
95[2]	117.8		

* Collection of Loye H. Miller

[1] Collection of National Museum

[2] Collection of Los Angeles Museum

ULNA

Plate III, fig. 1-4

Material available.-- 134 Parapavo; 29 Meleagris; 3 Agriocharis; 4 Pavo (2 individuals represented in Agriocharis and Pavo).

External glenoid facet.-- (Plate III a) Pavo with distal portion and distal border round slightly overhanging the shaft (flattened against shaft); Meleagris with marked overhang of distal portion, border more pointed; Agriocharis and Parapavo with overhang intermediate between Pavo and Meleagris, border somewhat pointed.

Internal glenoid facet.-- (Plate III b) Broad and flat in Pavo; less broad and having two small depressions in Agriocharis; long and narrow with uneven surface in Meleagris; Parapavo closest to Agriocharis in nature of surface, but broader.

Trochlea for articulation with cuneiform.-- (Plate III c) Approaching Agriocharis in degree of tilting (less than in Meleagris, or Pavo), and shape of proximal portion (not narrowed as in the other two genera).

Ulnar (outer) side of distal end.-- Flat in Meleagris; decidedly convex in Agriocharis; intermediate in Pavo (convex distally, but flattening about midway of extent of trochlea; Parapavo distinctly set apart from Meleagris, in being convex, some individuals tend to resemble Pavo, (condition between Agriocharis and Pavo).

Measurements.-- See Table V for complete list of measurements. Measurements made: Greatest length, Breadth of distal end, Antero-posterior breadth of shaft, Transverse breadth of shaft. Greatest length: Parapavo 139.5 - 101.5; Meleagris 150.8 - 111.1; Agriocharis 126.8 - 107.5; Pavo 121.9 - 107.6. Breadth of distal end relative to greatest length (mean): Parapavo 10.8%; Meleagris 10.32%; Agriocharis 10.5%; Pavo 11.2%.

Conclusions.-- Parapavo is closest to Agriocharis in all characteristics of the ulna, tho not identical with this genus. Measurements of this element do not present much evidence. A comparison of the ratios of breadth of distal end relative to greatest length in the four genera indicate closest relationship with Agriocharis. Due to the scarcity of specimens of both Agriocharis and Pavo, however, definite conclusions on this basis are inadvisable.

TABLE V

TABLE V

Measurements of Ulna

Catalog Number	Greatest Length	Breadth of Distal End	Antero-post. Breadth of Shaft	Transverse Breadth of Shaft	Ratio of Breadth of Distal End to Greatest Length.
E8020	139.5mm	14.1mm	10.2mm.	8.7mm.	10.1%
6799	139.4	15.1	10.2	8.5	10.8
6239	138.4	15.0	10.1	8.4	10.8
5637	138.3	15.4	10.3	8.7	11.1
5442	237.1	14.5	10.4	8.7	10.5
7875	136.5	14.7	9.8	8.3	10.7
5867	136.3	14.6	9.8	8.7	10.7
6192	136.0	15.0	9.6	8.1	11.0
6603	135.7	14.6	9.7	8.1	10.7
5056	135.7a	14.3	9.9	7.9	10.5
6157	135.6	14.3	9.7	8.5	10.5
6480	135.1	14.6	10.0	8.3	10.8
7959	135.0	14.6	10.0	8.8	10.8
5074	135.0	15.2	9.9	8.6	11.2
6127	134.9	14.6	10.0	8.2	10.8
7485	134.8	14.7	9.5	8.3	
6072	134.7	14.3	10.0	9.3	10.6
5667	134.6	14.6	10.5	9.3	10.8
5917	134.4a	14.7	10.0	8.1	10.9
5128	134.3	13.5	9.4	8.0	10.0
5870	134.2	14.3	9.7	8.2	10.6
5700	134.1	15.3	10.5	8.9	11.4
6960	134.0	14.2	10.2	9.0	10.5
5307	134.0	14.5	10.0	8.4	10.8
5234	134.0	13.7	9.8	8.5	10.2
7256	133.9	14.8	10.0	8.7	11.0
5200	133.7	15.5	10.3	8.5	11.59
6090	133.6	15.1	10.8	9.2	11.3
6598	133.4	14.4	9.9	7.5	10.79
6002	133.3	15.0	9.8	7.9	11.2
G6732	133.2	14.3	10.0	8.2	10.7
E5176	133.2	14.3	69.7	8.4	10.7
6119	132.9	14.1	9.7	8.3	10.6
5284	132.9	14.4	9.8	7.9	10.8
5318	132.7	13.7	9.2	8.0	10.3
7642	132.7	14.6	9.9	8.6	11.0
5376	132.3	14.9	10.0	8,2	11.2
5340	132.2	15.0	10.0	8.7	11.3
5187	132.1	14.3	9.4	8.2	10.8
5271	131.8	13.9	9977	7.8	10.5

TABLE V
(Continued)

Parapavo continued

Catalog Number	Greatest Length	Breadth of Distal End	Antero-post. Breadth of Shaft	Transverse Breadth of Shaft	Ratio of Breadth of Distal End to Greatest Length
E7397	131.7	14.7	10.1	8.7	11.1
7304	131.6	14.0	9.7	8.1	10.6
5779	131.5	14.9	9.7	8.5	11.3
6080	131.4	14.2	9.4	8.0	10.8
5990	131.4	14.4	9.2	7.7	10.9
6441	131.2	14.5	10.0	9.0	11.0
7412	131.0	14.6	10.4	8.7	11.1
6274	131.0	13.5	9.7	8.3	10.3
5055	130.7	14.2	9.8	8.6	10.8
6297	130.7	14.7	9.6	8.7	11.2
6367	130.6	13.7	9.3	7.4	10.4
6296	130.5	14.6	9.5	8.4	11.1
5291	130.4	14.1	9.7	8.0	10;8
7888	130.4	14.0	9.8	8.3	10.7
6536	130.2	13.7	9.5	7.8	10.6
5387	129.8	15.3	10.3	8.7	11.7
6083	129.6	14.7	10.7	8.7	11.3
7637	129.5	14.2	10.0	8344	10.9
5970	129.4	13.8	9.5	8.4	10.6
7162	129.3	13.7	9.3	8.0	10.6
6001	129.1	14.4	9.3	8.5	11.1
6285	129.1	13.8	9.8	7.9	10.6
5886	128.6	14.0	9.6	8.0	10.8
5313	128.3	13.7	10.1	815	10.6
5904	128.2	14.4	9.4	8.7	11.2
6193	127.8	14.5	9.0	8.0	11.3
5282	127.8	14.0	9.4	8.2	10.3
5612	127.4	14.6	9.8	8.6	11.4
6335	127.4	13.7	9.3	7.9	10.7
5082	127.3	13.8	9.8	8.3	10.8
5997	127.0	13.7	10.0	8.6	10.7
6342	126.7	12.8a	9.1	7.8	10.1a
5298	126.5	14.4	9.6	8.4	11.3
G6733	125.3	14.0	8.8	7.3	11.1
E6118	125.3	14.0	9.7	8.2	11.1
5338	125.1	13.9	9.8	8.3	11.1
7585	124.6	14.6	9.8	8.2	11.7
5381	124.6	13.7	9.3	8.2	11.0
5342	124.5	13.5	9.2	8.2	10.7
6850	123.8	14.1	9.3	8.0	11.3
6901	123.8a	13.8	9.8	8.57.8	11.11.2
5106	123.0	13.8	9.5	7.	

TABLE V
(Continued)

Parapavo continued

Catlog Number	Greatest Length	Breadth Bf Distal End	Antero-post. Breadth of Shaft	Transverse Breadth of Shaft	Ratio of Breadth of Distal End to Greatest Length
E5264	122.3mm.	14.1mm.	9.6mm.	8.3mm.	11.5%
6404	120.9	13.5	8.6	7.0	11.1
7311	117.8	12.2	8.1	7.9	10.3
5883	116.6	12.6	8.4	7.2	10.8
7772	114.1	11.9	8.3	6.7	10.4
6130	113.4	11.5	8.2	6.8	10.1
6195	112.2	12.3	8.2	7.1	10.9
G6525	112.2	11.6	8.3	7.1	10.3
E5693	112.0	12.4	8.1	6.8	11.0
6394	111.7	11.6	8.2	6.8	10.3
7390	111.7	12.0	8.2	7.1	10.7
5654	111.6	11.6	8.6	7.2	10.39
8511	111.2	11.8	7.8	6.4	10.6
6395	110.7	11.9	8.3	6.8	10.7
5316	110.4	11.9	8.0	6.8	10.7
7971	110.3	11.3	8.3	6.8	10.2
5769	110.3	11.3	7.9	6.3	10.2
7225	110.2	11.9	7.8	6.7	10.8
6551	109.9	11.4	7.3	6.4	10.3
6712	109.8	10.9	8.2	7.1	9.9
6081	109.7	12.0	7.9	6.7	10.9
5159	109.6	11.6	8.1	6.9	10.5
6315	109.4	11.3	7.8	6.5	10.3
5178	109.1	12.0	7.8	6.7	10.99
6235	108.9	11.8	8.0	6.6	10.8
G6440	108.8	11.0	8.2	6.5	10.1
E6483	108.8	12.1	8.2	6.8	11.1
6389	108.7	11.6	8.1	6.6	10.6
7433	108.3	12.0	7.6	6.4	11.0
6184	108.2	11.9	7.4	6.2	11.0
G6139	108.1	11.7	8.1	6.5	10.8
E5845	108.0	11.8	8.1	6.3	10.9
G6570	107.7	11.4	8.0	7.8	10.5
6623	107.7	11.4	7.9	7.2	10.5
E5487	107.7	11.5	8.0	6.5	10.6
6974	107.6	11.8	7.7	6.5	10.8
5837	107.5	11.5	7.6	6.4	10.69
5708	107.4	11.6	7.8	6.6	10.8
6132	107.3	10.9	7.5	6.2	10.1

TABLE V
(Continued)

Parapavo continued

Catalog Number	Greatest Length	Breadth of Distal End	Antero-post. Breadth of Shaft	Transverse Breadth of Shaft	Ratio of Breadth of Distal End to Greatest Length
E6534	106.9mm.	11.4mm.	7.8mm.	6.6mm.	10.6%
5125	106.8	11.3	7.9	6.5	10.5
5355	106.6	12.8	7.7	6.8	12.0
5932	106.4	11.8	7.8	6.4	11.0
6819	105.7	12.2	8.4	7.0	11.5
5668	105.5	11.8	7.6	6.6	11.1
6438	105.1	10.5	7.1	5.8	9.99
8609	104.5	11.1	7.7	6.0	10.6
5726	103.9	11.2	7.9	6.2	10.7
6349	103.3	11.3	7.4	5.9	10.9
6647	103.0	11.3	7.7	6.6	10.9
5370	102.7	10.6	8.2	7.1	10.3
5586	101.5	10.9	7.8	6.3	10.7
				Mean	10.8%
			Agriocharia		
19851*	126.8	13.3	9.1	7.5	10.4
19851	126.8	13.3	8.7	7.4	10.4
288710**	107.5	11.6	7.6	6.0	10.7
				Mean	10.5%
			Pavo		
208*	121.9	14.1	9.1	7.5	11.5
208	121.3	14.0	8.6	6.8	11.6
95***	107.6	11.8	8.0	7.3	10.9
95	107.3	11.9	8.0	7.0	11.1
				Mean	11.2%

Table V ulna

Meleagris

U.S. Nat. Mus. No.					
288403	150.8mm.	15.0mm.	10.0mm.	9.0mm.	9.5%
288403	150.8	15.0	10.0	8.2	9.5
	144.5	14.5	9.9	8.0	10.0
	144.1	14.6	10.6	8.3	10.3
	140.2	14.3	9.4	7.8	10.1
	138.0	15.0	10.5	8.0	10.79
	134.9	13.0	8.8	6.7	9.6
	121.5	12.5	8.2	6.6	10.2
	121.4	12.5	8.4	6.5	10.2
	121.0	12.3	8.4	6.8	10.9
289448 and 288404	121.0	11.6	8.3	6.7	9.5
	120.5	12.8	8.6	6.8	10.6
	120.4	12.4	8.5	6.9	10.3
	120.2	12.0	8.8	7.7	9.9
	119.7	11.9	8.4	6.4	9.9
	119.6	12.0	8.1	7.0	10.0
	119.6	12.3	8.8	6.4	10.2
	118.9	12.5	8.9	7.0	10.5
	118.8	11.8	8.2	7.0	9.9
	118.7	11.7	7.8	6.4	9.8
	118.3	12.3	8.4	6.6	10.4
	116.3	11.5	8.0	6.1	9.9
	115.7	13.0	8.3	7.3	11.2
	115.3	11.7	8.1	6.6	10.1
	115.2	12.8	8.1	7.4	11.1
	114.5	11.5	8.2	6.3	10.4
	113.9	11.6	7.7	6.0	10.1
	112.6	11.2	8.3	6.3	9.9
	111.1	11.3	8.7	6.7	10.2
				Mean	10.1445
				σ	.4138
				σ_M	.0768

Agriocharis

L.H.Miller Coll. No.					
19851	126.8	13.3	9.1	7.5	10.4
19851	126.8	13.3	8.7	7.4	10.4
U.S.Nat.Mus.288710	107.5	11.6	7.6	6.0	10.7
				Mean	10.5
				σ	.1414
				σ_M	.08163

Pavo

L.H.Miller Coll. No.					
208	121.9	14.1	9.1	7.5	10.5
208	121.3	14.0	8.6	6.8	11.5
L.A.Mus.No. 95	107.6	11.8	8.0	7.3	10.9
L.A.Mus.No. 95	107.3	11.9	8.0	7.0	11.1
				Mean	10.25
				σ	.2598
				σ_M	.1299

	σ_d	$\frac{d}{\sigma_d}$	
Parapavo vs. Meleagris	.08347	7.82	σ's +
Parapavo vs. Agriocharis	.98792	3.380	σ's +
Parapavo vs. Pavo	.1533	2.953	σ's +

TABLE V
(Continued)

M.
Meleagris

Cat. No.	Greatest Length	Breadth of Distal End	Antero-post. Breadth of Shaft	Transverse Breadth of Shaft	Ratio of Breadth of Distal End to Greatest Length
	150.8mm.	15.0mm.	10.3mm.	9.0mm.	9.5%
	150.8	15.0	10.0	8.2	9.5
	144.5	14.5	9.9	8.0	10.0
	144.1	14.6	10.6	8.3	10.3
	140.2	14.3	9.4	7.8	10.1
	138.0	15.0	10.5	8.0	10.4
	134.9	13.0	8.8	6.7	9.1
	121.5	12.5	8.2	6.6	10.2
	121.4	12.5	8.4	6.5	10.2
	121.0	12.3	8.4	6.8	10.1
	121.0	11.6	8.3	6.7	9.5
	120.5	12.8	8.6	6.8	10.6
	120.4	12.4	8.5	6.9	9.5
	120.2	12.0	8.8	7.7	9.9
	119.7	11.9	8.4	6.4	9.9
	119.6	12.0	8.1	7.0	10.0
	119.6	12.3	8.8	6.4	10.2
	118.9	12.5	8.9	7.0	10.5
	118.8	11.8	8.2	7.0	9.9
	118.7	11.7	7.8	6.4	9.8
	118.3	12.3	8.4	6.6	10.4
	116.3	11.5	8.0	6.1	9.9
	115.7	13.0	8.3	7.3	12.3
	115.3	11.7	8.1	6.6	11.2
	115.2	12.8	8.1	7.4	12.1
	114.5	11.5	8.2	6.3	11.0
	113.9	11.6	7.7	6.0	11.1
	112.6	11.2	8.3	6.3	10.9
	111.1	11.3	8.7	6.7	11.2
				Mean	10.32%

RADIUS

Plate III, fig. 1-4

Material available.-- 36 Parapavo; 27 Meleagris; 6 Agriocharis (3 individuals); 5 Pavo (3 individuals).

General shape.-- Similar to meleagrids; Pavo differing in greater degree of curvature and less flaring proximal end.

Ridge at distal end on anconal side.-- (Plate III a) In 26 specimens, ridge paralelling border of shaft and continuous distally with depression bordering ulnar facet; ridge long; most nearly approacning Agriocharis; Meleagris similar, but further removed from border; length of ridge Pavo with distinctly different position of ridge; ridge short, varying; In 10 specimens, position of ridge most like Agriocharis, but shorter as in Pavo and some specimens of Meleagris.

Tendinal groove at distal end.-- (Plate III b) Notched, but less deeply so than Pavo or Agriocharis; Meleagris broad and shallow. Extent of groove similar to Meleagris, less than Pavo, greater than Agriocharis.

Palmar side of distal end.-- Shape of distal end and arrangement of muscle scars turkey-like.

Conclusions.-- Tho in both the muscle ridge and the tendinal groove, there is a tendency to closer relationship of Parapavo with Agriocharis than with Meleagris or Pavo, it is evident that the two are not identical. All characters point to the meleagrid nature of Parapavo.

CARPO-METACARPUS

(Plate IX, Figs. 1-3)

The only reliable character of this element, on which to base the relationship of Parapavo ~~californicus~~, is the tuberosity (Plate ~~IX~~, Figs. 1-4, a), a large flange-like projection at the proximal end of Metacarpal II. In its broad, flat shape, and its extent from Metacarpal II to ~~IV~~ III actually fusing with III in some specimens, it is similar to Meleagris and Agriocharis, but quite distinct from Pavo. In the latter genus, the tuberosity is a small process, lacking the flange-like structure of Parapavo and the turkeys; it is more proximal in position and does not extend to Metacarpal III.

Meleagris and Agriocharis resemble one another so nearly with respect to this character, that it is inadvisable to attempt to establish relationship of Parapavo with one or the other genus.

Mel. 30, Ag. 6, Pa. 6, Pp.

FEMUR

(Plate

Material available.-- 100 Parapavo; 32 Meleagris; 4 Agriocharis/ (2 individuals); 3 Pavo (2 individuals).

Pneumaticity.-- Distinctly unlike Pavo in lack of pneumatic foramina on anterior side, resembling meleagrids in this respect.

Intermuscular lines on posterior side of shaft.-- (Plate Similar to turkeys and distinct from Pavo. Of the meleagrids, more nearly like Agriocharis; less convergence of lines in Meleagris.

Lesser trochanter.-- Well defined and roughened ridge, divided into two protruberances by shallow transverse groove. Similar to Meleagris; Agriocharis less distinctly grooved; Pavo with region broadly rounded, no groove.

Intercondylar groove.-- Broad, and similar in depth to Meleagris but broader; Agriocharis deeper and narrower than either Parapavo of Pavo shallowest and broadest.

Inner condyle.-- Long antero-posteriorly, relative to proximo-distal depth & projecting almost at right angles to shaft both anteriorly and posteriorly; Meleagris and Agriocharis of relatively less extent antero-posteriorly; projecting anteriorly as in Parapavo, but forming wide oblique angle with shaft posteriorly; Pavo unlike meleagrids and Parapavo in being much deeper anteriorly than posteriorly and having rounded edge, so that angle of projection is dissimilar; posterior portion with protruberance on proximal border, characteristic of Pavo alone.

Measurements.-- Greatest length: Parapavo 130.3mm. -- 100.6mm., average male 121.3mm.; Meleagris 137.9mm.-- 102.1mm., average male 131.3mm.; Agriocharis male 112.8mm., female 94.9mm.; Pavo male 111.8mm., female 105.3mm.. Transverse and antero-posterior breadth of shaft relative to length: Similar to turkeys; Pavo with much broader shaft relative to length. (See Table VI for complete list of measurements.)

Relationships.-- The femur of Parapavo is unquestionably turkey-like, lacking the pneumaticity which characterized this element in Pavo. That it is not identical with either Meleagris or Agriocharis is indicated by the shape of the intercondylar groove and the inner condyle, as well as by its intermediate position with regard to size; of one hundred specimens of the fossil genus there are none as large as the largest Meleagris, nor as small as the smallest Agriocharis.

TABLE VI

Measurements of Femur

Parapavo

Cat. No.	Greatest Length	Trans. Breadth of shaft	Antero-posterior breadth of shaft	Breadth of proximal end	Breadth of distal end
E5772	130.0mm.	12.8mm.	10.9mm.	32.6mm.	29.2mm.
7030	128.4	11.5	19.2	30.8	
7820	127.8	12.6	10.8	31.4	27.6
5687	126.5	11.9	10.4	31.2	27.4
5468	126.3	12.5	10.4	33.2	28.5
7718	126.2	11.6	10.5		26.4
5201	126.2	11.4	10.4	29.4	
6896	126.0	11.0	9.5	20.5	27.3
5607	125.5	11.8	10.7	30.5	27.2
5377	125.5	11.8	10.4	30.3	26.6
8233	125.4	13.0	11.0	31.6	28.2
7238	125.3	11.6	9.8	29.7	27.2
7941	125.0	12.5	10.1	20.3	26.6
6611	124.0	12.0	10.0	32.0	26.6
5309	124.9	11.6	10.2	30.1	27.4
5274	124.8	12.7	10.4	30.8	27.2
5319	124.6	12.3	11.0	32.0	28.0
5946	124.1	12.5	10.5	30.7	25.6
7853	123.7	12.2	9.9	29.8	26.4
5083	123.6	12.3	10.6	31.0	27.4
5817	123.4	13.0	10.6	32.5	28.5
5753	123.3	11.7	10.4	30.2	27.4
5052	123.1	12.6	10.4	30.0	25.8
6078	123.0	12.0	10.5	29.3	26.8
6550	123.0	11.4	9.8	30.0	
5615	123.0	12.2	11.5	29.1	26.3
5608	122.9	12.1	9.8	30.0	26.3
5984	122.8	11.7	10.4	31.4	27.3
5215	122.5	11.7	9.9	29.4	25.8
6333	122.5	11.4	9.9	28.8	25.0
7668	122.4	12.8	10.0	29.6	26.4
6276	121.9	12.2	9.8		25.2
5249	121.7	11.8	9.8	29.3	27.1
7691	121.6	11.5	9.1	29.1	26.3
5283	121.5	12.5	10.3	31.7	27.9
6360	121.5	12.4	11.5	29.9	27.0
5183	121.5	11.0	10.0	29.0	26.0

TABLE VI
(Continued)

Parapavo continued

Catalog Number	Length	Trans. Breadth of Shaft	Antero-Posterior Breadth of Shaft	Breadth of proximal end	Breadth of distal end
E5180	121.4mm.	12.5mm.	10.3mm.	30.5mm.	27.3mm.
5286	121.3	11.8	9.4	30.0	27.3
5207	121.1	12.1	9.7		27.8
6287	12111	11144	10000	28933	
5966	120.8	12.0	9.8	331.2	27.1
6092	120.6	12.0	10.3	30.0	26.3
8040	120.5	12.3	10.7	30.4	26.7
5218	120.5	12.2	10.3	30.1	26.3
7112	120.3	11.4	10.4	28.7	25.8
5214	120000	10.9	10.0	27.5	25.0
5172	119.6	11.7	9.5	28.6	25.5
6472	119.4a	12.1	9.4	31.0	27.3
5188	119.4	12.3	9.7	29.6	26.6
7607	119.1	12.3	9.9	29.1a	26.9
7562	119.0	11.7	9.8	30.2	26.5
6371	119.0	11.2	9.7	29.8	26.2
6099	118.7	10.8	8.5	25.0	22.2
5329	118.6	11.5	9.4		25.0
6511	118.0	11.7	10.5	30.2	25.5
F4420	122.0	11.8	10.3	20.6	21.4
E5693	117.8	10.6	9.2	27.8	
5060	116.8	11.6	9.7	29.5	25.0
7961	116.6	12.0	9.0	27.3	25.3
7741	116.4	11.7	9.5	28.5	25.9
6282	115.9	11.4	10.0		24.9
7692	115.4a	10.2	8.9		22.8
5699	115.3a	10.6	9.1		24.7
5987	115.2	12.0	10.3	31.4	27.4
5189	115.2	11.6	9.5	26.2	23.4
5998	115.1	11.7	9.5	29.7	25.4
6570	115.0	12.0	10.1		26.7
6110	114.7	10.9	9.6	27.4	24.9
7235	113.2	11.9	9.8		25.3
5114	112.2	11.1	9.4	27.8	24.7
5882	111.4	10.3	9.1		22.6

TABLE VI
(Continued)

Parapavo continued

Catalog Number	Greatest Length	Trans. Breadth of shaft	Antero-posterior Breadth of shaft	Breadth of proximal end	Breadth of distal end
E5378	110.5mm.	10.5mm.	9.0mm.	24.7mm.	23.0mm.
5393	110.5	10.3	8.7	25.8	20.3
5385	110.4	11.3	9.3	28.7	24.5
7755	109.8	10.0	9.0	25.0	22.3
5652	108.5	9.9	8.4	25.4	22.2
6393	108.4	10.5	9.3		22.3
5436	105.8a	10.3	8.5	24.7	22.0
5947	103.3	9.5	8.3	24.5	21.8
6071	103.0	9.8	8.0	24.7	21.0
6423	104.9	10.0	8.2	24.5	21.0
7043	104.6	10.5	8.4	25.0	21.8
6509	104.6	10.3	8.1	25.3	20.9
6041	104.2	10.5	8.4	24.6	20.4
6100	104.2	9.6	8.4	25.3	21.0
5821	104.1	10.8	9.4	24.7	21.9
6300	104.1	10.2	8.5	24.2	21.4
6018	103.8	10.7	8.4	25.4	21.8
5625	103.8	10.5	8.9		22.1
5314	103.6	10.2	8.3	24.4	21.8
5610	103.5	9.7	8.5	24.3	22.3
6048	103.4	9.8	8.4		21.8
5375	103.2	10.0	8.4	25.2	21.1
5057	102.8	10.0	8.4	23.9	21.6
6310	102.3	10.0	8.2	23.2	21.0
7368	101.55	10.5	9.2	24.7	21.5
5192	101.5	9.0	7.8	22.3	21.9
5194	101.2	9.9	8.4	24.3	20.6
6797	100.6	10.0	8.1	24.6	22.0

TABLE XX
(Continued)

Meleagris

Catalog Number	Greatest Length	Trans. Breadth of Shaft	Antero-posterior Breadth of Shaft	Breadth of Proximal End	Breadth of Distal End
	137.9mm.	13.2mm.	11.8mm.	32.7mm.	29.0mm.
	133.8	13.1	11.0	32.1	28.7
	132.5	13.3	11.7	31.3	28.9
	132.2	12.5	10.8	29.8	27.5
	131.8	12.5	11.6	29.7	28.1
	130.7	12.5	11.1	29.9	28.3
	130.0	13.2	11.6	31.6	28.5
	127.6	11.8	11.3	29.7	27.8
	127.5	12.3	11.2	31.2	27.3
	119.4	11.8	9.1	26.9	23.6a
	111.5	10.8	10.0	25.6	23.2
	111.1	10.8	8.9	25.6	21.5
	110.6	10.6	9.1	25.1	22.0
	109.8	11.1	9.9	26.1	24.2
	109.3	9.9	9.3	25.1	22.3
	109.1	10.0	9.1	23.5	21.2
	108.5	10.0	9.6	23.7	21.4
	108.3	10.6	8.9	25.3	22.6
	107.8a	10.6	9.6	25.4	22.8
	107.8	10.8	10.0	23.8	22.0
	107.1a	11.1	9.1	23.6	21.8
	104.8	10.4	9.1	23.2	21.7
	104.0	10.3	9.4	24.1	20.9
	103.9	10.0	9.7	24.3	20.7
	103.9	9.7	8.9	23.6	20.2
	103.7	9.6	8.7	22.2	19.8
	103.3	10.5	8.8	23.4	20.9
	102.9	10.5	9.4	23.4	21.5
	102.7	10.2	9.2	24.4	20.5
	102.7	9.1	8.2	23.4	20.8
	102.4	9.3	7.6	23.8	20.3
	102.1	10.0	8.4	23.8	20.6

TABLE VI
(Continued)

Agriocharis

Catalog Number	Greatest Length	Trans. Breadth of Shaft	Antero-posterior Breadth of Shaft	Breadth of proximal end	Breadth of distal end
19851*	112.8mm.	10.2mm.	9.4mm.	25.6mm.	23.0mm.
19851	112.1	10.4	9.4	26.0	23.1
288710**	95.7	9.1	8.0	20.5	19.9
288711**	94.9	9.1	7.4	21.3	18.7

Pavo

208*	111.8	11.7	10.0	25.7	24.8
*** 95	105.5	11.4	10.2	22.3	22.6

* Collection of Loye H, Miller
** Collection of National Museum
*** Collection of Los Angeles Museum

TIBIO-TARSUS

(Plate X, Figs. ~~5-8~~ 1-4)

Material available.-- 45 Parapavo (for measurement, 35); 4 Agriocharis (2 individuals); 48 Meleagris (for measurement 14); 6 Pavo (for measurement, 4 = 2 individuals).

Cnemial crest.-- (Plate X, ~~c~~ a) Most abruptly thrust toward outside in Agriocharis[1]; Parapavo similar to Meleagris and Pavo. ~~Shape of~~ crest narrower ~~proximally~~ in Pavo than in Parapavo and meleagrids.

Measurements.-- Greatest length: Parapavo 212.2mm. -- 156.9mm,; Meleagris 216.3mm. -- 162.1mm.; Agriocharis male 186.8, female 150.6mm.; Pavo male 197.0mm., female 161.9mm.. Breadth of distal end relative to length of bone: Parapavo 10% -- 8.5%, mean 9.4%; Meleagris 11.3% -- 9.5%, mean 10.0%; Agriocharis male 8.7%, female 9.7%; Pavo male 8.9%, female 9.8%. Antero-posterior breadth of shaft relative to transverse breadth: Parapavo 91.9% -- 74.0%, mean 79.8%; Meleagris 93.4% -- 81.2%, mean 87.4%; Agriocharis 77.3% and 75.5%; Pavo 77.4% and 76.8%. (See Table VII for complete list of measurements).

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[1] This point agrees with the fact noted by Miller (1916) for Agriocharis as compared with Parapavo and Pavo. Additional material of Meleagris, places this genus with Parapavo and Pavo in this respect.

Relationships.-- With respect to the cnemial crest, Parapavo most nearly resembles Meleagris, both in shape and in position. Actual measurement of length provides little information, though apparently the fossil species does not attain as great length as Meleagris gallopavo, nor on the other hand, is the opposite extreme as small as the female Agriocharis ocellatus. Aside from the superiority of Meleagris in length, the relative measurements indicate a greater breadth of distal end as well as greater antero-posterior breadth relative to transverse breadth of shaft, the mean ratio of Meleagris in the latter case, lacking but .27 of being $2\sigma's'$[1] removed from the mean of Parapavo[1]. Parapavo is apparently closer to Agriocharis and Pavo with respect to these latter points, but scarcity of specimens of these modern genera makes any conclusions along this line inadvisable.

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[1] In a normal curve it is possible to compute 66% of the numbers; these lie between +1 and -1 with respect to the mean. This is done by finding the standard deviation or σ which equals

$$\sqrt{\frac{\text{The sum of the numbers}^2}{n} - (\text{The mean of the numbers})^2}$$

and adding and subtracting this from the mean.

TABLE VII

Measurements of Tibio-tarsus

Parapavo

Cat. No.	(a) Greatest Length	(b) Breadth of Distal End	(c) Trans. Breadth of Shaft	(d) Antero-posterior Breadth of Shaft	(e) Ratio of (b) to (a)	(f) Ratio of (d) to (c)
B6021	212.2mm.	20.1mm.	11.7mm.	9.1mm.	9.4%	77.1%
7085	211.1	20.4	11.9	9.5	9.6	79.8
7965	211.1	19.4a	11.8	9.2	9.2	77.9
6013	210.5	20.5	11.8	8.9	9.7	75.4
6020	210.1	19.9	11.1	8.7	9.4	78.3
5403	207.1	19.4	11.8	9.1	9.3	77.1
5245	206.0	19.3	11.7	9.3	9.3	79.5
6111	205.7	19.1	12.0	9.0	9.3	75.0
F 6993	205.1	18.7	11.3	9.2	9.1	81.4
E 5029	204.6	19.5	12.0	8.9	9.5	74.0
7170	204.0	19.3	12.3	9.6	9.4	78.0
8432	203.1	19.4	11.7	9.3	9.5	79.3
5498	202.0	18.7	10.7	8.7	9.0	81.4
5418	200.4	20.1	11.4	9.2	10.0	81.2
5261	198.9	19.3	11.0	8.9	9.7	80.8
6163	198.6	18.2	11.3	8.7	9.1	77.8
5171	198.2	18.6	10.1	8.0	9.4	79.1
5780	198.0	19.1	10.0	8.1	9.6	81.0
6584	197.1	19.9	10.3	8.5	10.0	82.5
7943	195.4	19.7	11.0	8.5	10.0	77.2
7873	194.0a	18.8	11.7	9.2	9.7	77.9
5482	192.6	19.4	11.4	8.7	10.0	76.3
8091	191.7	19.1	10.8	8.8	9.9	81.9
8039	190.1	17.3	10.7	8.3	9.0	77.5
5079	173.6	15.4	9.3	7.5	8.7	80.7
5432	172.9	16.1	9.1	7.7	9.3	84.7
6101	172.0	16.1	9.6	7.2	9.3	75.1
6670	169.0	15.9	8.4	8.1	9.4	86.0
5203	168.2	15.5	9.0	7.7	9.6	85.0
6290	168.0	15.8	9.2	6.9	9.4	75.0
5834	167.2	14.3	866	7.9	8.5	91.9
7583	166.9	16.7	9.4	7.6	9.9	80.8
7881	163.7	16.4	9.0	7.5	9.9	83.3
7009	158.1	15.0	8.3	6.8	9.4	81.9
7486	156.9	15.4	9.0	7.5	9.8	83.4
					Mean 9.45%	79.3%

TABLE VII
(Continued)

Meleagris

Cat. No.	(a) Greatest Length	(b) Breadth of Distal End	(c) Trans. Breadth of Shaft	(d) Antero-posterior Breadth of Shaft	(e) Ratio of (b) to (a)	(f) Ratio of (d) to (c)
	216.3mm.	21.2mm.	10.7mm.	8.9mm.	9.8%	82.4%
	214.5	21.1	11.0	9.7	9.8	88.2
	213.0	21.4	11.2	10.4	10.0	92.9
	212.5					
	208.0	19.9	11.0	9.0	9.5	81.7
	203.5	22.0	11.2	9.1	11.3	81;2
	183.0	17.6	9.2	8.6	9.6	92.4
	175.7	17.3	8.7	8.7	9.8	87.7
	175.2	17.5	9.1	8.5	9.9	93.4
	174.8	17.4	9.1	8.5	9.9	93.4
	170.1	17.0	9.4	7.8	9.9	83.3
	166.2	16.3	9.0	7.4	9.8	82.3
	165.2					
	163.3	16.9	8.1	7.1	10.3	87.7
[1] 288402	162.3	17.0	8.5	7.8	10.4	92.7
[1] 288402	162.1	16.6	8.4	7.1	10.2	84.6
					Mean 10.1	87.4

Agriocharis

*19851	186.8	16.4	9.9	7.8	8.7	76.8
19851	185.2	16.2	10.1	7.8	8.9	77.2
[1] 288710	150.8	14.7	8.4	6.5	9.7	77.4
288710	150.6	14.4	8.4	6.5	9.5	77.4
					Mean 9.2	77.2

Pavo

*208	197.0	17.6	10.0	7.6	8.9	76.0
208	192.2	17.5	10.5	7.9	9.1	76.3
[2] 95	162.5	16.0	9.7	7.5	9.8	77.3
95	161.9	16.0	9.8	7.4	9.8	75.5
					Mean 9.4	76.2

FIBULA

Due to the variability in the fibula of Pavo and Agriocharis, little importance can be attached to this element.

One characteristic of the fossil species, however, which is constant, is the ~~tuberosity~~ convexity in the center of the external surface of the proximal end. Parapavo, in this respect, resembles none of the modern forms, though it is furthest removed from Meleagris, in which genus the outer surface of the proximal end is straight. Both Agriocharis and Pavo are slightly convex, but in Pavo, this is not a constant character, one available individual being straight. The inner (tibial) side of the proximal end in Parapavo most nearly approaches Meleagris, but the resemblance is not perfect.

TARSO-METATARSUS

(Plate XX, Figs. 1 - 4)

Material available.-- 129 Parapavo californicus (60 adult male); 46 Meleagris gallopavo (6 adult male); 3 Agriocharis ocellatus (1 adult male); 3 Pavo cristatus (1 adult male).

General shape.-- Resembling meleagrids; shaft in Pavo heavier and stockier; no distinction evident between the two modern genera of turkeys.

Spur core.-- (Plate XX, b) Well formed and long, as in Agriocharis; Meleagris having short spur, roughly built; Pavo with short spur, though well-developed.

Foramen on inner side at distal end.-- (Plate XX, a) Meleagris having at least faint depression both anteriorly and posteriorly in all specimens, and distinct foramen in 27 out of 46; in Agriocharis faintly visible, on anterior side only, in one specimen, absent in 2; Parapavo intermediate, having foramen in all but two specimens, though varying from faint depression as in Agriocharis to well marked foramen as in Meleagris, greater number resembling specimens of Meleagris having faint foramen; absent in Pavo.

Incipient third ridge between inner and outer ridges of hypotarsus.-- Well marked in Parapavo, Agriocharis and Pavo[1]; 31 speci-

[1]The Agriocharis material from the National Museum furnishes evidence of similarity with Parapavo, and thus slightly alters the conclusions reached by Miller (1916) regarding closer relationship between Pavo and Parapavo.

mens of Meleagris from the National Museum collection, reveal 18 lacking third ridge, 5 having small ridge to one side of position expected (may or may not correspond to ridge as noted in Parapavo), and remaining 8 with ridge present.

Measurements.-- (Of adult males only). Greatest length: Parapavo 147.7mm. -- 124.0mm., mean 138.8mm.; Meleagris gallopavo 162.0mm. -- 133.8mm., mean 149.5; Agriocharis 136.8; Pavo 138.2mm. Ratio of distance of spur core from distal end to greatest length: Parapavo 41.3% -- 49.7%, mean 45.6%; Meleagris 42.2% -- 46.9%, mean 44.9%; Agriocharis 40%; Pavo 42%. (See Table VIII)for complete list of measurements).

Relationships.-- In general, the shape of the tarso-metatarsus of Parapavo is turkey-like. The presence, also, of a intertrochlear foramen on the inner side ~~at the distal end~~ classes the fossil genus with the meleagrids rather than with the phasianids. Considering the variability of this character within each of the modern turkey genera, and within Parapavo as well, it seem unwise to class the fossil with either Meleagris or Agriocharis on this basis. The presence of a third ridge of the hypotarsus links Parapavo with Agriocharis and Pavo rather than with Meleagris. Since but a single male specimen each of Agriocharis and Pavo is available for measurement, it is impossible to draw any conclusions regarding the relationships of Parapavo on the basis of size; the specimens of both Agriocharis and Pavo come within the standard deviation of

Parapavo. Regarding Meleagris, however, it is evident that not only does this modern genus tend to larger size than does the fossil, but the range in size is greater. In relative distance of spur core from the distal end, Parapavo most nearly approaches Meleagris. Agriocharis and Pavo are both more than a ~~sigma~~ σ removed from the mean of Parapavo and of Meleagris.

See Plate 7, figs. 1-4 for dist. of spur core from dist. end.

TABLE VII

Measurements of Tarso-metarsus

Parapavo

Catalog Number	(a)Greatest Length	(b)Distance from Middle Trochlea to top of spur	Ratio of (b) to (a)
R5333	147.7mm.	65.0mm.	44.0%
6073	147.3	66.0	44.8
6039	146.5	65.0	44.4
6839	145.8	67.8	46.5
8025	145.1	67.6	[illegible]
6578	144.6	67.3	45.5
6173	144.2	66.2	45.9
6801	144.2	54.8a	
6271	144.1	62.6	43.4
6660	143.7	66.8	46.4
6305	143.6	63.0	43.9
5347	142.9	54.9a	
5174	142.9	62.7	43.8
6689	142.8	64.4	45.1
5324	142.6	56.6a	
7339	142.3	65.4	45.9
5205	142.0	61.9a	
8476	142.0	63.5	44.7
6725	141.9	61.5	43.3
8475	141.9	65.4	46.5
7649	141.8	61.3	43.3
5717	141.6	65.5	45.2
6103	141.4	68.1	48.2
6518	141.4	53.4a	
7145	141.2	56.1a	
6806	140.9	61.8	43.8
7059	140.3	60.1a	
7054	139.9	66.2	47.3
6711	139.5	63.9	45.8
7672	139.7	63.9	45.5
6454	139.7	63.8	45.8
7181	139.3	63.8	45.8
6659	139.1	64.3	46.2
5177	139.0	64.9	46.8
5272	138.8	55.3a	
7538	138.5	57.3	41.3

TABLE VII(
(Continued)

Parapavo continued

Catalog Number	(a)Greatest Length	(b)Distance from Middle Trochlea to top of spur	Ratio of (b) to (a)
E6837	138.4mm.	64.9mm.	46.9%
5833	137.6	62.7	45.5
5784	137.6	65.4	47.6
5635	137.6	65.6	47.7
7146	137.5		
8390	137.0	64.3	46.9
7294	136.3	61.7	44.4
6843	135.8	63.7	46.8
6838	135.0	59.2	43.9
6690	135.0	61.3	45.6
7983	134.6	64.3	47.7
8389	134.3	61.2	45.3
6317	134.1	61.0	45.4
6602	133.9	63.8	47.6
8004	133.7	60.1	44.9
6625	133.7	57.7	43.1
6113	133.4	65.7	49.3
7455	133.3	62.1	46.6
7215	132.2	52.1a	
6849	130.0	52.3a	
6474	129.8	57.2	44.0
6552	129.6	64.3	49.7
6993	126.5	60.4	47.7
E5412	124.0	59.4	47.9

TABLE VII
(Continued)

Meleagris

Catalog Number	(a) Greatest Length	(b) Distance from Middle Trochlea to top of spur	Ratio of (b) to (a)
	133.8mm.	61.0mm.	45.5%
	145.6	65.8	45.1
	149.7	68.2	45.6
	153.9	68.1	44.2
	152.5	64.5	44.2
	162.0	76.1	46.9
		Mean	44.9

Agriocharis

19851*	136.8	54.8	40.0

Pavo

208*	138.2	58.0	41.9

*Collection of Loye H. Miller

PELVIS AND SACRUM

Material available.-- Parapavo: 9 fragments of combined ~~sacral and~~ pelvic ~~elements~~, 23 fragments of ~~pelvis~~ innominate alone; Meleagris: 24 fragmentary material; Agriocharis: 3 complete; Pavo: 2 complete.

Distinguishing characters between meleagrids and phasianids, in all of which Parapavo resembles the meleagrids.-- ~~Pelvis~~ Innominate: (1) Ilium of meleagrids receding from ~~anti~~trochanter, and not overhung by well-developed iliac crest as in phasianids; Pavo, having depression in ilium between ~~the~~ anti-trochanter and ~~the~~ iliac crest. (2) Ilio-sciatic foramen pointed posteriorly in meleagrids; round in Pavo, and of less extent posteriorly. (3) Anterior ~~junction~~ approximation of right and left ilia of greater extent in meleagrids than in Pavo. ~~Sacrum~~ Synsacrum: (1) Ventral view: ~~deleted~~ Pavo with downward curvature at sacral vertebrae, 2, 3, and 4, tending to shorten the sacrum ~~in~~ Pavo; meleagrids with slight downward curvature at sacral vertebra 6 ~~in meleagrids~~. (2) Dorsal view: meleagrids lacking the noticeable divisions between the vertebrae, evident in Pavo.

VERTEBRAL COLUMN

There is so much variation in the vertebral columns of the modern species, that a discussion of this part of the skeleton will be omitted, with the exception of the pygostyle. This bone is distinctly different in the Meleagridae and in Pavo. Parapavo conforms with the former in being a smaller bone, thus indicating the absence of a large tail such as characterizes the peacocks.

TABLE IX

CHART SHOWING SYSTEMATIC POSITION OF PARAPAVO CALIFORNICUS RELATIVE TO MELEAGRIS GALLOPAVO, AGRIOCHARIS OCELLATUS AND PAVO CRISTATUS

	Phasianidae (Pavo)	Meleagridae	Meleagris	Agriocharis	Unlike all
Skull					
1 General shape		X		X	
2 Relative height of parietal and frontal regions		X			X
3 Region of fronto-parietal suture					X
4 Region of fronto-nasal suture					X
5 Breadth of frontal at widest portion and at fronto-nasal suture				X	
Sternum					
1 Carina					
Shape		X		X	
Breadth		X			
2 Manubrium		X		X	
3 Inner surface		X			
Furcula					
1 General shape					
Anterior view			X		
Lateral view			X		
2 Furcular process					
Shape		X			
Length	X				
3 Osseous area dorsal to process					
Breadth			X		
Depth	X				X
4 Muscle pattern					X
Coracoid					
1 Outer side of sternal end		X			
2 Flexure of upper end		X			X
3 Shape of head			X		
4 Scapular facet		X			X
5 Attachment of coraco-humeral ligament		X			
6 Muscle line on inner side of posterior surface			X		

Scapula						
1 General shape		X				
2 Relative size of coracoidal and glenoidal facets					X	
Humerus						
1 General shape Head						X
2 Muscle scars		X		X		
Ulna						
1 Curvature of shaft		X				
2 External articular facet		X			X	
3 Articular surface for scapholunar		X				
4 Breadth of distal end relative to length	X					X
Radius						
1 Ridge at distal end, external aspect				X		
2 Tendinal groove						X
Carpo-metacarpus		XX				
Femur						
1 Degree of pneumaticity		X				
2 Pattern of intermuscular lines		X			X	
3 Lesser trochanter		X		X		
4 Inter-condylar groove			X			
5 Inner condyle		X				X
6 Relative breadth of shaft		X				
Tibip-tarsus						
1 Cnemial crest		X	X			
2 Relative breadth of distal end	X					X
3 Ratio of depth to breadth of shaft						X
Fibula						X

Tarso-metatarsus					
1 General shape		X			
2 Shape of spur core					X
3 Inner foramen at distal end		X		X	
4 3rd ridge of hypotarsus	X				X
5 Distance of spur from distal end			X		
Pelvis		X			
Vertebral column					
Pygostyle		X			

CONCLUSIONS

From the foregoing review of the skeletal elements of Parapavo californicus, compared with those of Meleagris gallopavo and Agriocharis ocellatus of the family Meleagridae, and with those of Pavo cristatus of the Phasianidae, it is apparent that the fossil genus should be placed with the Meleagridae.

As to the position of Parapavo relative to Meleagris, a glance at the chart (Table IX) will show that the individual characteristics of the separate elements of Parapavo fall into five groups with regard to the two modern meleagrid genera: (1) Those which are distinct from Agriocharis, but approach Meleagris; (2) those which are like Meleagris; (3) those which are intermediate, though tending a little more toward one or the other of the modern genera; (4) those resembling Agriocharis; and (5) those which are distinct from Meleagris, but approach Agriocharis. Grouping the characters for each element together, we find that the following elements possess characters of each of the modern genera, and thus may be said to be intermediate: Tarso-metatarsus, tibio-tarsus, radius, and humerus, ~~is~~ in all characters nearer Meleagris: Furcula, ~~sternum~~. Others in all characters ~~resemble~~ Agriocharis: Ulna, scapula, and skull. The remaining elements either possess characters distinct from both genera (~~carpoid~~, fibula), or have structural features common to all three genera (~~femur~~, carpo-metacarpus,

Taking into consideration each individual characteristic of each element, it will be seen from the chart that the balance of similarity is in favor of Agriocharis, both with respect to evidence derived from statistical study and with purely optical observations with regarding structure.

pelvis ~~and sacrum~~, and pygostyle). This evidence indicates then, that Parapavo is a distinct generically from occupying a position somewhat intermediate between Meleagris and Agriocharis, ~~tending toward in position with regard~~ between these two, the tending toward greater similarity with Agriocharis. The possibility that Parapavo is ancestral to either or both of the modern genera has been considered, but the idea has been discarded as improbable. A form as highly specialized as Parapavo and possessing characters similar to both modern genera as well as distinct characters of its own, probably represents, rather, a type, now extinct, which has had a common ancestry with the modern genera.

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9 It will be noted that this conclusion is in accord with the idea advanced by Wetmore upon observation of the tarso-metatarsus.

Taking into consideration each individual characteristic of each element, it will be seen from the chart that the balance of similarity is in favor of Agriocharis, not only from the point of view of evidence derived from observations with regarding structure, shape etc. but also from a strictly statistical study of measurements.

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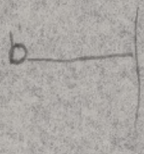
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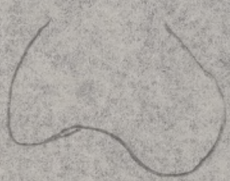

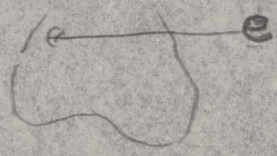
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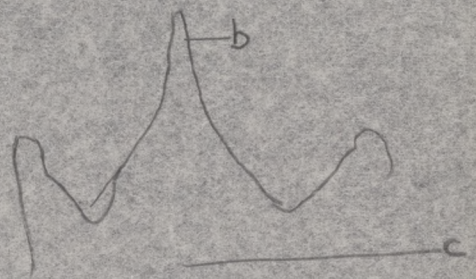
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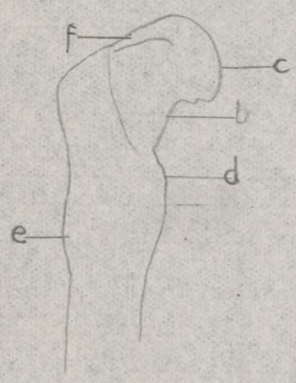
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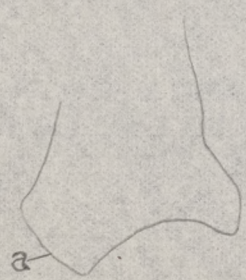
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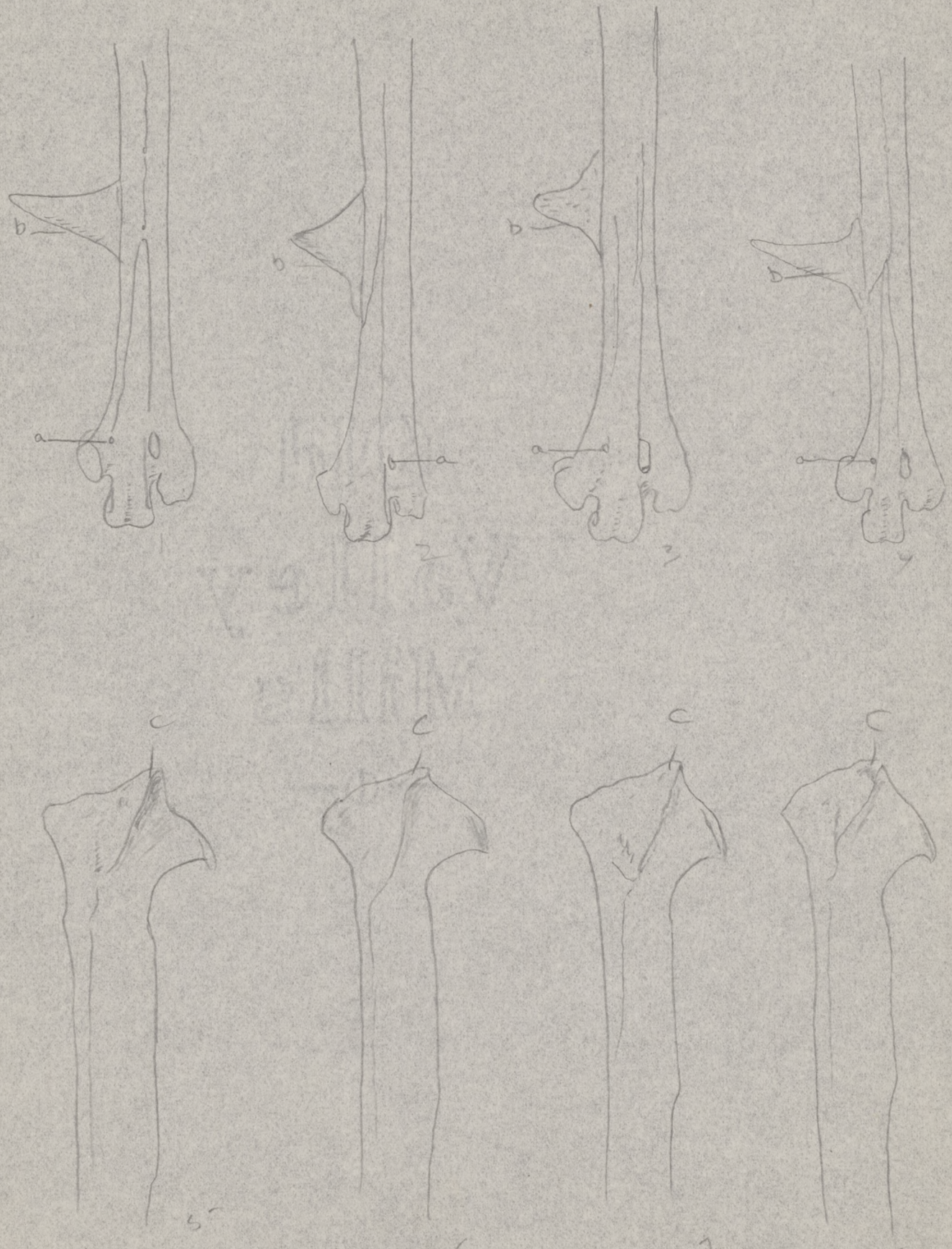

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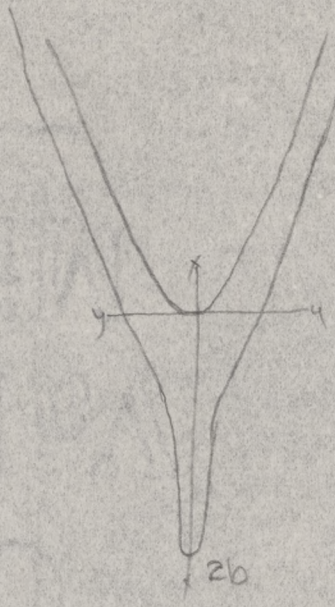
2a

1b



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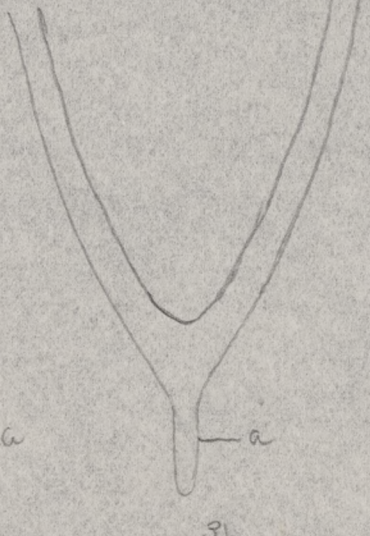
3a

4a



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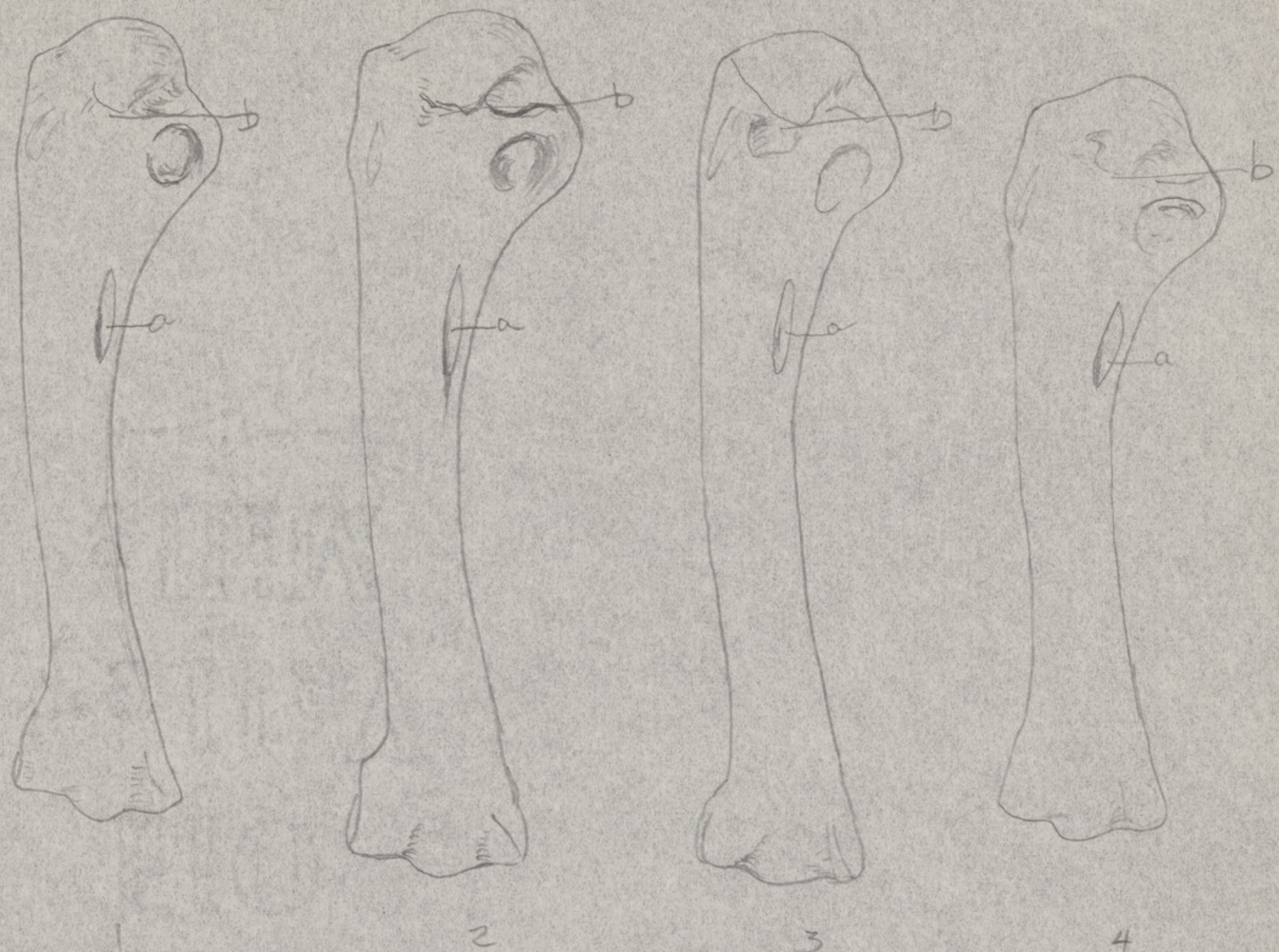

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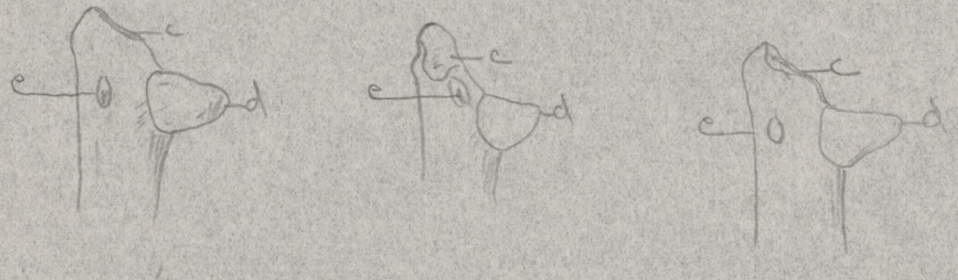

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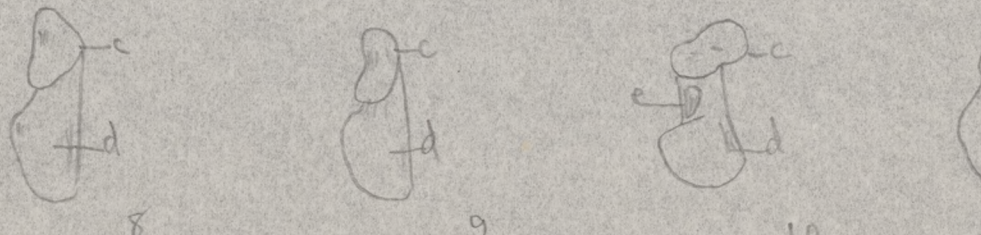

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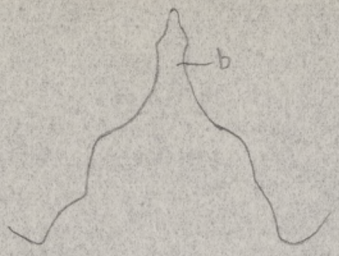

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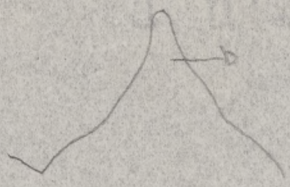

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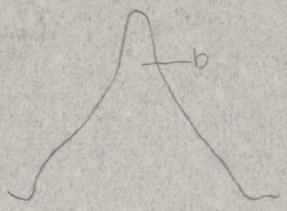

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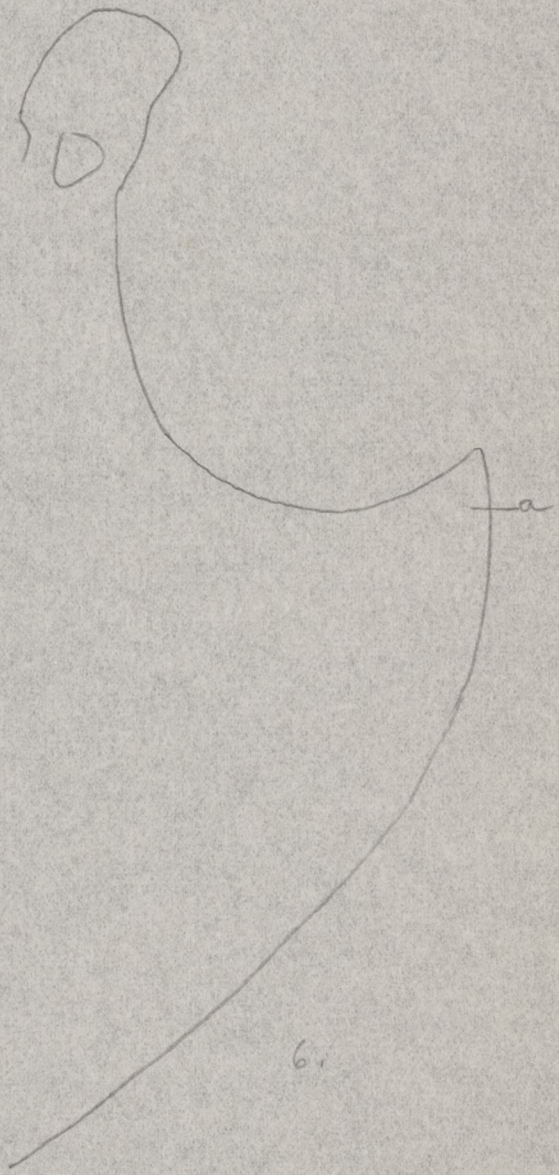

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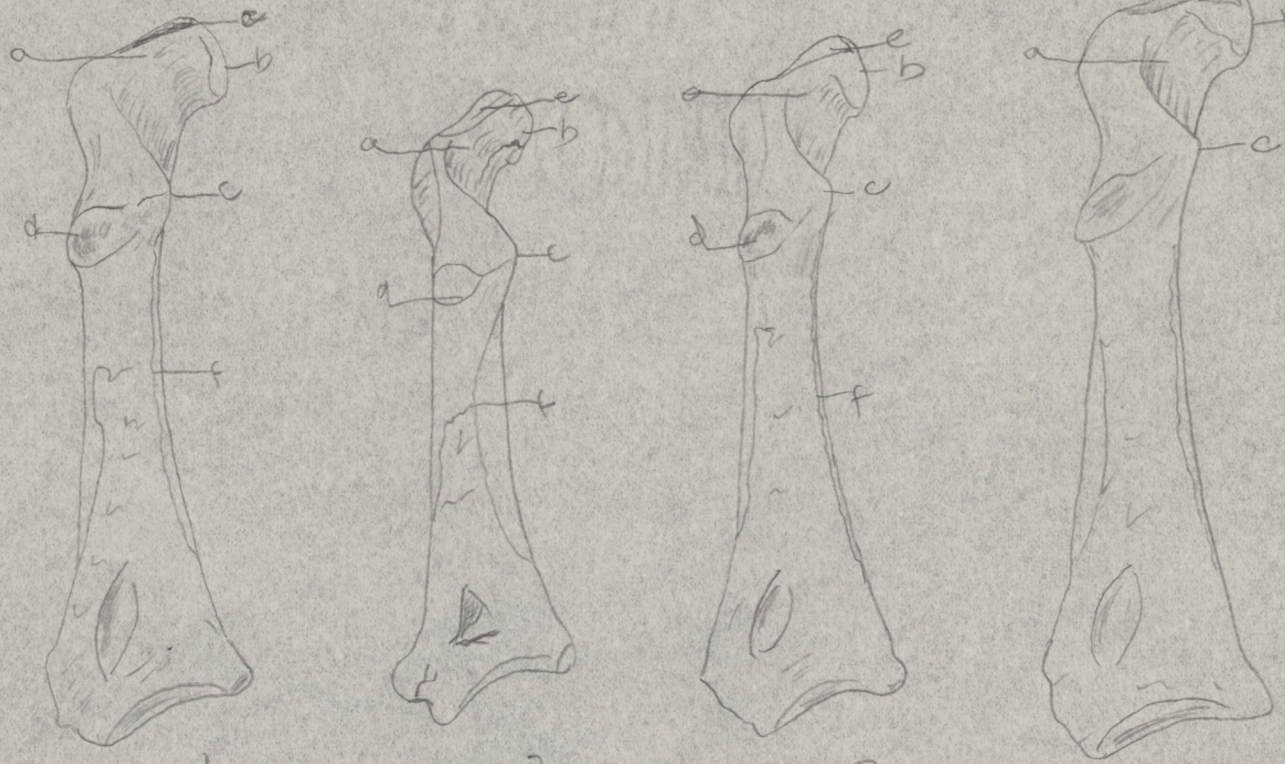

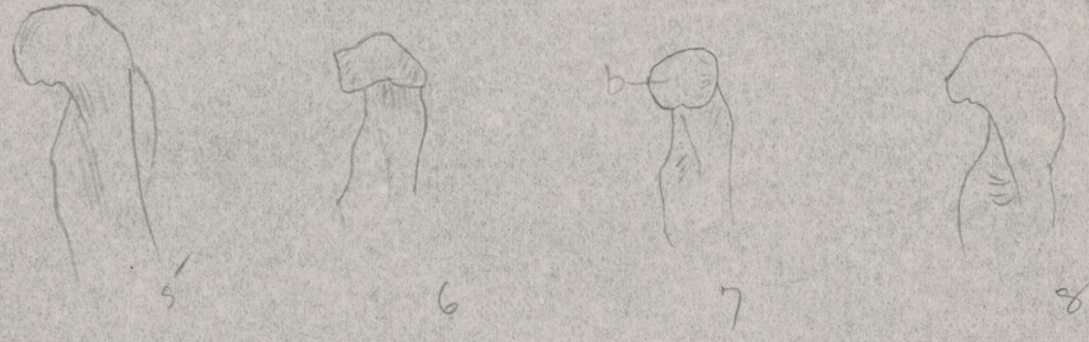

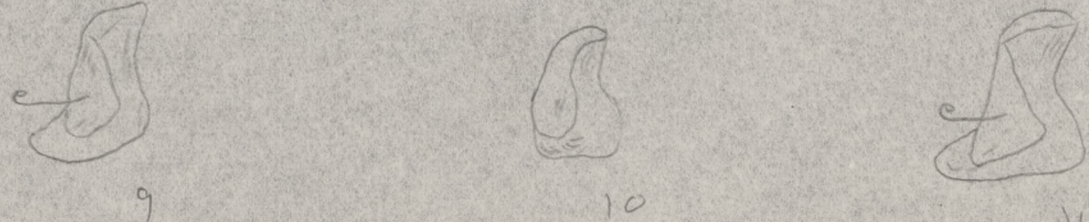

Plate 1

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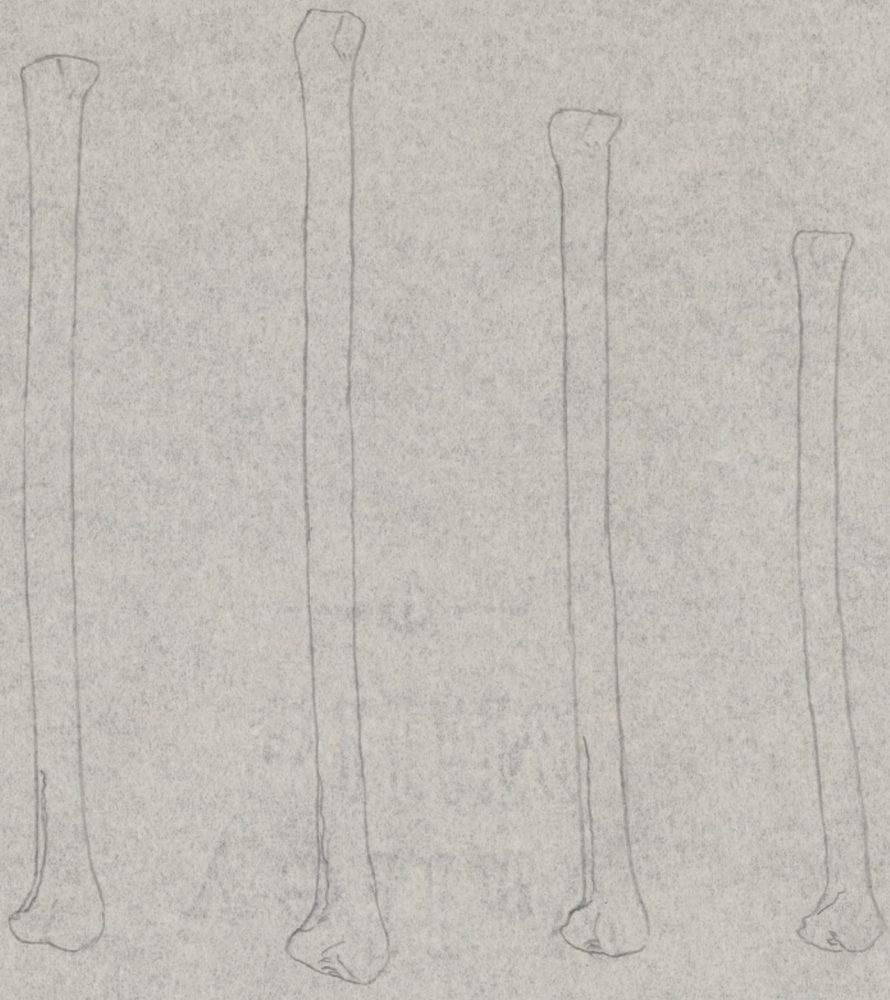
Plate VII



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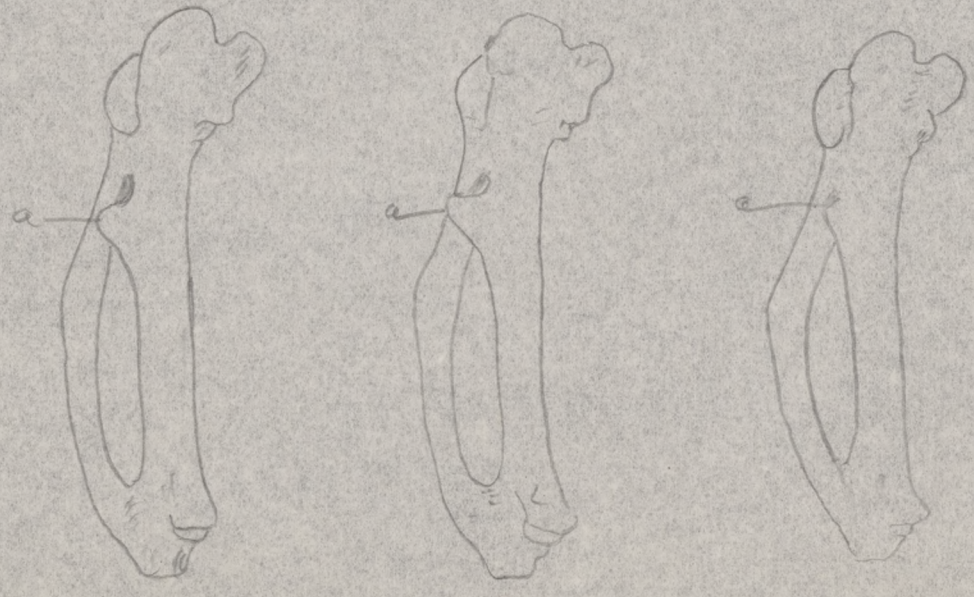

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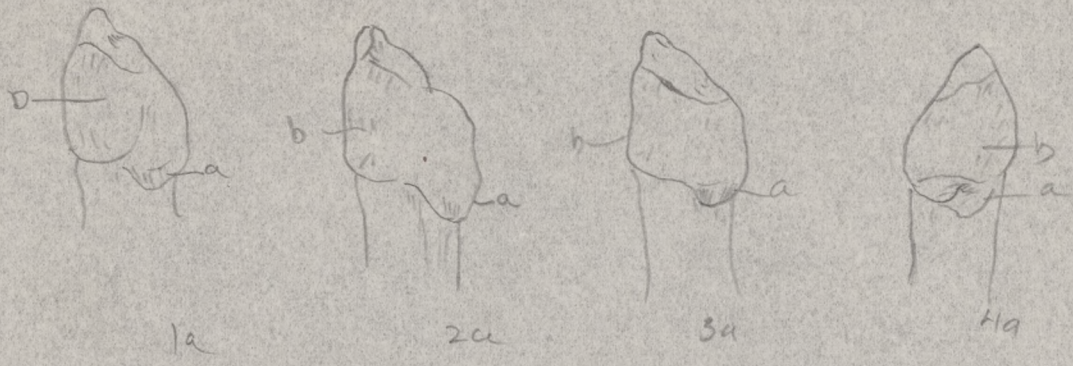

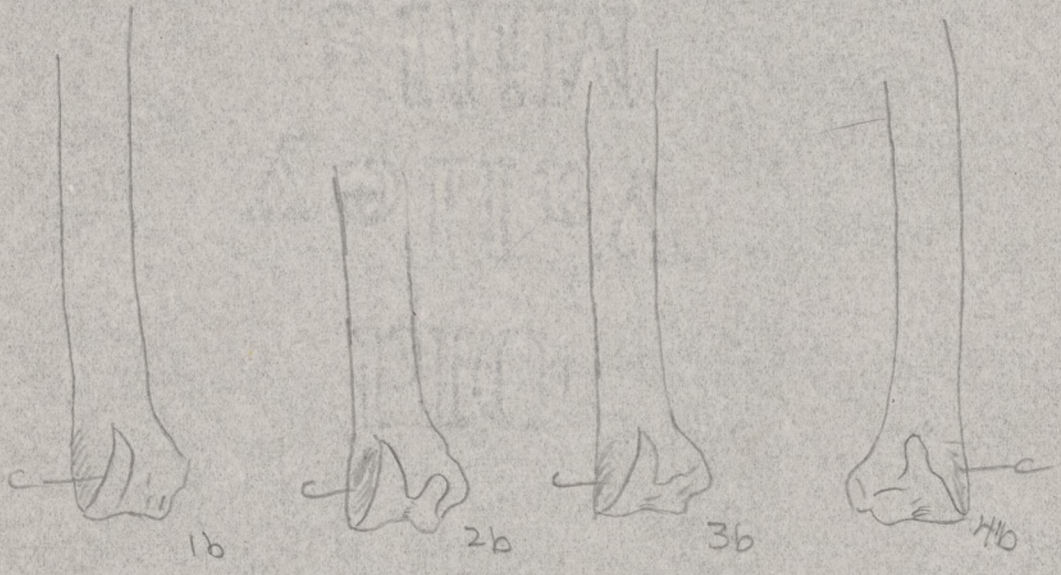

Plate I

Figs. 1 - 4 Dorsal view of skull: 1, Pavo cristatus; 2, Meleagris gallopavo; 3, Parapavo californicus; 4, Agriocharis ocellatus.

Figs. 5-8 Palmar view of ulna: 5, Parapavo californicus; 6 Meleagris gallopavo; 7, Agriocharis ocellatus; 4, Pavo cristatus.

a, frontal

b, parietal

c, supraorbital flare

d, fronto-parietal suture region of

e, region of frontal suture

f, external articular facet

Plate II

Figs. 1-4 Lateral view of skull: 1, Parapavo californicus;
2, Meleagris gallopavo; 3, Agriocharis ocellatus; 4, Pavo cristatu

a, frontal

b, parietal

d, region of fronto-parietal suture

Figs. 5-8 Anconal view of humerus: 5, Parapavo californicus;
6, Meleagris gallopavo; 7, Agriocharis ocellatus; 8 Pavo cristatus

e, head

f, muscle attachment

g, attachment of deltoid muscle

Plate III

Lateral view of anterior end of sternum: Fig. 1, Parapavo californicus; fig. 2, Meleagris gallopavo; fig. 3, Agriocharis ocellatus; ~~x~~/ fig. 4, Pavo cristatus.

a, carina

b, manubrium

Plate IV

Inner (superior) view of portion of sternum: Fig. 1, Parapavo californicus; fig. 2, Meleagris gallopavo; fig. 3, Agriocharis ocellatus; fig. 4, Pavo cristatus.

b, manubrium

c, depressions on inner surface

Plate V

Furcula: Figs. 1-4 lateral x view; Figs. 5-8 posterior view. Figs. 1 and 5 Agriocharis ocellatus; figs. 2 and 6, Meleagris gallopavo; figs. 3 and 8 Pavo cristatus; figs. 4 and 7 Parapavo californicus.

a, furcular process

b, osseous area dorsal to furcular process

Plate VI

Coracoid: Figs. 1-4, inner view; figs. 5-8, posterior view.

Figs. 1 and 5, Parapavo californicus; figs. 2 and 6 Meleagris gallopavo; figs. 3 and 7, Agriocharis ocellatus; figs. 4 and 8 Pavo cristatus.

a, outer side of sternal end

b, tendinal groove

c, head

d, praecoracoidal process

e, scapular facet

f, attachment of coraco-humeral ligament

g, muscle line

Plate VII

Figs. 1-4, proximal end of coracoid, dorsal view: 1, Meleagris gallopavo; 2, Pavo cristatus; 3, Parapavo californicus; 4, Agriocharis ocellatus.

f, attachment of coraco-humeral ligament

Figs. 5-8, proximal ~~xxx~~ end of scapula: 1, Parapavo californicus; 2, Meleagris gallopavo; 3, Agriocharis ocellatus; 4, Pavo cristatu

a, tendinal furrow

b, glenoid facet

c, pneumatic orifice

Figs. 9-16 radius: Figs. 9- 12, ulnar side; figs. 13-19, radial (palmar) side. Figs. 9 and 13, Parapavo californicus; figs. 10 and 14, Meleagris gallopavo; figs. 11 and 15, Agriocharis ocellatus; figs. 12 and 16, Pavo cristatus.

d, muscle ridge

e, tendinal groove

Plate VIII

Figs. 1-4, inner view of scapula: ~~X~~ 1, Parapavo californicus; 2, Meleagris gallopavo; 3, Agriocharis ocellatus; 4, Pavo cristatu

a, tendinal furrow

bb, glenoid facet

c, pneumatic orifice

Figs. 5-8, anconal view of ulna: 1, Parapavo californicus; 2, Meleagris gallopavo, 7. Pavo cristatus; 8, Agriocharis ocellatus.

Plate IX

Figs. 1-4, Carpo-metacarpus: 1, Parapavo californicus; 2, Meleagris gallopavo; 3, Agriocharis ocellatus; 4, Pavo cristatus.

a, tuberosity of the external Metacarpi ulnaris

Figs. 5-8, posterior view of femur: 1, Parapavo californicus; 2, Meleagris gallopavo; 3, Agriocharis ocellatus; 4, Pavo cristatus.

b, intermuscular lines

c, lesser trochanter

d, intercondylar groove

e, protruberance on proximal border of inner condyle, peculiar to Pavo.

Plate X

Anterior view of tibio-tarsus: Fig. 1, Parapavo californicus; fig. 2, Meleagris gallopavo; & fig. 3, Agriocharis ocellatus; fig. 4, Pavo cristatus.

Plate XI

Lateral view of tibio-tarsus: Fig. 1, Parapavo californicus; fig. 2, Meleagris gallopavo; fig. 3, Agriocharis ocellatus; fig. 4, Pavo cristatus.

a, cnemial crest

Plate XII

Lateral view of tarso-metatarsus: Fig. 1, Parapavo californicus; fig. 2, Meleagris gallopavo; fig. 3, Agriocharis ocellatus; fig. 4, Pavo, cristatus.

Plate XIII

Anterior view of tarso-metatarsus: Fig. 1, Parapavo californicus; fig. 2, Meleagris gallopavo; fig. 3, Agriocharis ocellatus; fig. 4, Pavo cristatus.

a, spur core

b, intertrochlear trochlear foramen

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